## SEQUENCE LISTING

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<110> Jonsonn, Julie Ruth
       Powell, Elizabeth Ellen
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| ctc               | ggca              | gtg               | ccgg              | aaaa              | cg c              | cgcct             | tece              | I                 |                   | ccg<br>Pro        |                   | Ser               |                   |                   |                   | 5  | 32 |
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|                   |                   |                   |                   |                   | cta<br>Leu        |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   | 5  | 80 |
|                   |                   |                   |                   |                   | gga<br>Gly        |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   | 6  | 28 |
| ctg<br>Leu<br>40  | gtg<br>Val        | aag<br>Lys        | cgg<br>Arg        | aag<br>Lys        | cgc<br>Arg<br>45  | atc<br>Ile        | gag<br>Glu        | gcc<br>Ala        | atc<br>Ile        | cgc<br>Arg<br>50  | ggc<br>Gly        | cag<br>Gln        | atc<br>Ile        | ctg<br>Leu        | tcc<br>Ser<br>55  | 6  | 76 |
| aag<br>Lys        | ctg<br>Leu        | cgg<br>Arg        | ctc<br>Leu        | gcc<br>Ala<br>60  | agc<br>Ser        | ccc<br>Pro        | ccg<br>Pro        | agc<br>Ser        | cag<br>Gln<br>65  | Gly<br>999        | gag<br>Glu        | gtg<br>Val        | ccg<br>Pro        | ccc<br>Pro<br>70  | ggc<br>Gly        | 7  | 24 |
|                   |                   |                   |                   |                   | gtg<br>Val        |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   | 7  | 72 |
|                   |                   |                   |                   |                   | gca<br>Ala        |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   | 8  | 20 |
| tac<br>Tyr        | gcc<br>Ala<br>105 | aag<br>Lys        | gag<br>Glu        | gtc<br>Val        | acc<br>Thr        | cgc<br>Arg<br>110 | gtg<br>Val        | cta<br>Leu        | atg<br>Met        | gtg<br>Val        | gaa<br>Glu<br>115 | acc<br>Thr        | cac<br>His        | aac<br>Asn        | gaa<br>Glu        | 8  | 68 |
|                   |                   |                   |                   |                   | aag<br>Lys<br>125 |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   | 9  | 16 |
| aac<br>Asn        | aca<br>Thr        | tca<br>Ser        | gag<br>Glu        | ctc<br>Leu<br>140 | cga<br>Arg        | gaa<br>Glu        | gcg<br>Ala        | gta<br>Val        | cct<br>Pro<br>145 | gaa<br>Glu        | ccc<br>Pro        | gtg<br>Val        | ttg<br>Leu        | ctc<br>Leu<br>150 | tcc<br>Ser        | 9  | 64 |
| cgg<br>Arg        | gca<br>Ala        | gag<br>Glu        | ctg<br>Leu<br>155 | cgt<br>Arg        | ctg<br>Leu        | ctg<br>Leu        | agg<br>Arg        | ctc<br>Leu<br>160 | aag<br>Lys        | tta<br>Leu        | aaa<br>Lys        | gtg<br>Val        | gag<br>Glu<br>165 | cag<br>Gln        | cac<br>His        | 10 | 12 |
| gtg<br>Val        | gag<br>Glu        | ctg<br>Leu<br>170 | tac<br>Tyr        | cag<br>Gln        | aaa<br>Lys        | tac<br>Tyr        | agc<br>Ser<br>175 | aac<br>Asn        | aat<br>Asn        | tcc<br>Ser        | tgg<br>Trp        | cga<br>Arg<br>180 | tac<br>Tyr        | ctc<br>Leu        | agc<br>Ser        | 10 | 60 |
| aac<br>Asn        | cgg<br>Arg<br>185 | ctg<br>Leu        | ctg<br>Leu        | gca<br>Ala        | ccc<br>Pro        | agc<br>Ser<br>190 | gac<br>Asp        | tcg<br>Ser        | cca<br>Pro        | gag<br>Glu        | tgg<br>Trp<br>195 | tta<br>Leu        | tct<br>Ser        | ttt<br>Phe        | gat<br>Asp        | 11 | 80 |
| gtc<br>Val<br>200 | acc<br>Thr        | gga<br>Gly        | gtt<br>Val        | gtg<br>Val        | cgg<br>Arg<br>205 | cag<br>Gln        | tgg<br>Trp        | ttg<br>Leu        | agc<br>Ser        | cgt<br>Arg<br>210 | gga<br>Gly        | gly<br>aaa        | gaa<br>Glu        | att<br>Ile        | gag<br>Glu<br>215 | 11 | 56 |
| ggc<br>Gly        | ttt<br>Phe        | cgc<br>Arg        | ctt<br>Leu        | agc<br>Ser        | gcc<br>Ala        | cac<br>His        | tgc<br>Cys        | tcc<br>Ser        | tgt<br>Cys        | gac<br>Asp        | agc<br>Ser        | agg<br>Arg        | gat<br>Asp        | aac<br>Asn        | aca<br>Thr        | 12 | 04 |

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Ile Arg Gly Gln Ile Leu Ser Lys Leu Arg Leu Ala Ser Pro Pro Ser 50 55 60

Gln Gly Glu Val Pro Pro Gly Pro Leu Pro Glu Ala Val Leu Ala Leu 65 70 75 80

Tyr Asn Ser Thr Arg Asp Arg Val Ala Gly Glu Ser Ala Glu Pro Glu 85 90 95

Pro Glu Pro Glu Ala Asp Tyr Tyr Ala Lys Glu Val Thr Arg Val Leu 100 105 110

Met Val Glu Thr His Asn Glu Ile Tyr Asp Lys Phe Lys Gln Ser Thr 115 120 125

His Ser Ile Tyr Met Phe Phe Asn Thr Ser Glu Leu Arg Glu Ala Val 130 135 140

Pro Glu Pro Val Leu Leu Ser Arg Ala Glu Leu Arg Leu Arg Leu 145 150 155 160

Lys Leu Lys Val Glu Gln His Val Glu Leu Tyr Gln Lys Tyr Ser Asn 165 170 175

Asn Ser Trp Arg Tyr Leu Ser Asn Arg Leu Leu Ala Pro Ser Asp Ser 180 185 190

Pro Glu Trp Leu Ser Phe Asp Val Thr Gly Val Val Arg Gln Trp Leu 195 200 205

Ser Arg Gly Gly Glu Ile Glu Gly Phe Arg Leu Ser Ala His Cys Ser 210 215 220

Cys Asp Ser Arg Asp Asn Thr Leu Gln Val Asp Ile Asn Gly Phe Thr 225 230 235 240

Thr Gly Arg Arg Gly Asp Leu Ala Thr Ile His Gly Met Asn Arg Pro 245 250 255

Phe Leu Leu Met Ala Thr Pro Leu Glu Arg Ala Gln His Leu Gln 265 270

Ser Ser Arg His Arg Arg Ala Leu Asp Thr Asn Tyr Cys Phe Ser Ser 275 280 285

Thr Glu Lys Asn Cys Cys Val Arg Gln Leu Tyr Ile Asp Phe Arg Lys 290 295 300

Asp Leu Gly Trp Lys Trp Ile His Glu Pro Lys Gly Tyr His Ala Asn 305 310 315 320

Phe Cys Leu Gly Pro Cys Pro Tyr Ile Trp Ser Leu Asp Thr Gln Tyr 325 330 335

Ser Lys Val Leu Ala Leu Tyr Asn Gln His Asn Pro Gly Ala Ser Ala 340 345 350

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<sup>&</sup>lt;222> (1)..(511)

<sup>&</sup>lt;223>

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| <220<br><221<br><222<br><223 | L><br>2>         | 3'UT<br>(168     | R<br>5)          | (182             | 1)               |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |    |     |
| <400                         |                  | 4                |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |    |     |
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| ccct                         | caca             | cgg              | cgtc             | cctc             | ag g             | cgcc             | ccca             | t tc             | cgga             | ccag             | CCC.             | tcgg             | gag              | tcgc             | cgacc            | CC | 120 |
| ggc                          | ctcc             | cgc              | aaag             | actt             | tt c             | ccca             | gacc             | t cg             | ggcg             | cacc             | ccc.             | tgca             | cgc              | cgcc             | ttcat            | c  | 180 |
| cccs                         | gcc              | tgt              | ctcc             | tgag             | cc c             | ccgc             | gcat             | c ct             | agac             | cctt             | tct              | cctc             | cag              | gaga             | cggat            | c  | 240 |
| tct                          | ctcc             | gac              | ctgc             | caca             | ga t             | cccc             | tatt             | c aa             | gacc             | accc             | acc              | ttct             | ggt .            | acca             | gatcg            | JC | 300 |
| gcc                          | catc             | tag (            | gtta             | tttc             | cg to            | ggga             | tact             | g ag             | acac             | aaaa             | ggt              | ccaa             | gcc              | tccc             | ctcca            | ac | 360 |
| cact                         | gcg              | ccc              | ttct             | ccct             | ga g             | gagc             | ctca             | g ct             | ttcc             | ctcg             | agg              | ccct             | cct .            | acct             | tttgc            | cc | 420 |
| aaae                         | agac             | ccc              | cagc             | ccct             | gc ag            | 3999°            | cggg             | g cc             | taca             | cacc             | aca              | ccag             | ccc ·            | tgtt             | cgcgc            | et | 480 |
| ctcg                         | gca              | gtg (            | ccgg             | 3 <b>3</b> 39    | cg co            | cgcci            | taaa             | I                |                  |                  | ccc f<br>Pro s   | Ser (            |                  |                  |                  |    | 532 |
| ctg<br>Leu                   | ctg<br>Leu       | ccg<br>Pro<br>10 | ctg<br>Leu       | ctg<br>Leu       | cta<br>Leu       | ccg<br>Pro       | ctg<br>Leu<br>15 | ctg<br>Leu       | tgg<br>Trp       | cta<br>Leu       | ctg<br>Leu       | gtg<br>Val<br>20 | ctg<br>Leu       | acg<br>Thr       | cct<br>Pro       |    | 580 |
| ggc                          | ccg<br>Pro<br>25 | ccg<br>Pro       | gcc<br>Ala       | gcg<br>Ala       | gga<br>Gly       | cta<br>Leu<br>30 | tcc<br>Ser       | acc<br>Thr       | tgc<br>Cys       | aag<br>Lys       | act<br>Thr<br>35 | atc<br>Ile       | gac<br>Asp       | atg<br>Met       | gag<br>Glu       |    | 628 |
| ctg<br>Leu<br>40             | gtg<br>Val       | aag<br>Lys       | cgg<br>Arg       | aag<br>Lys       | cgc<br>Arg<br>45 | atc<br>Ile       | gag<br>Glu       | gcc<br>Ala       | atc<br>Ile       | cgc<br>Arg<br>50 | ggc<br>Gly       | cag<br>Gln       | atc<br>Ile       | ctg<br>Leu       | tcc<br>Ser<br>55 |    | 676 |
| aag<br>Lys                   | ctg<br>Leu       | cgg<br>Arg       | ctc<br>Leu       | gcc<br>Ala<br>60 | agc<br>Ser       | ccc<br>Pro       | ccg<br>Pro       | agc<br>Ser       | cag<br>Gln<br>65 | glà<br>aaa       | gag<br>Glu       | gtg<br>Val       | ccg<br>Pro       | ccc<br>Pro<br>70 | ggc<br>Gly       |    | 724 |
| ccg<br>Pro                   | ctg<br>Leu       | ccc<br>Pro       | gag<br>Glu<br>75 | gcc<br>Ala       | gtg<br>Val       | ctc<br>Leu       | gcc<br>Ala       | ctg<br>Leu<br>80 | tac<br>Tyr       | aac<br>Asn       | agc<br>Ser       | acc<br>Thr       | cgc<br>Arg<br>85 | gac<br>Asp       | cgg<br>Arg       |    | 772 |

|                   |                   |                   |                   |                   |                   | gaa<br>Glu        |                   |                   |                   |                   |                   |                   |                   |                   |                   | 820  |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------|
|                   |                   |                   |                   |                   |                   | cgc<br>Arg<br>110 |                   |                   |                   |                   |                   |                   |                   |                   |                   | 868  |
|                   |                   |                   |                   |                   |                   | cag<br>Gln        |                   |                   |                   |                   |                   |                   |                   |                   |                   | 916  |
| aac<br>Asn        | aca<br>Thr        | tca<br>Ser        | gag<br>Glu        | ctc<br>Leu<br>140 | cga<br>Arg        | gaa<br>Glu        | gcg<br>Ala        | gta<br>Val        | cct<br>Pro<br>145 | gaa<br>Glu        | ccc<br>Pro        | gtg<br>Val        | ttg<br>Leu        | ctc<br>Leu<br>150 | tcc<br>Ser        | 964  |
|                   |                   |                   |                   |                   |                   | ctg<br>Leu        |                   |                   |                   |                   |                   |                   |                   |                   |                   | 1012 |
| gtg<br>Val        | gag<br>Glu        | ctg<br>Leu<br>170 | tac<br>Tyr        | cag<br>Gln        | aaa<br>Lys        | tac<br>Tyr        | agc<br>Ser<br>175 | aac<br>Asn        | aat<br>Asn        | tcc<br>Ser        | tgg<br>Trp        | cga<br>Arg<br>180 | tac<br>Tyr        | ctc<br>Leu        | agc<br>Ser        | 1060 |
|                   |                   |                   |                   |                   |                   | agc<br>Ser<br>190 |                   |                   |                   |                   |                   |                   |                   |                   |                   | 1108 |
| gtc<br>Val<br>200 | acc<br>Thr        | gga<br>Gly        | gtt<br>Val        | gtg<br>Val        | cgg<br>Arg<br>205 | cag<br>Gln        | tgg<br>Trp        | ttg<br>Leu        | agc<br>Ser        | cgt<br>Arg<br>210 | gga<br>Gly        | Gly<br>999        | gaa<br>Glu        | att<br>Ile        | gag<br>Glu<br>215 | 1156 |
| ggc               | ttt<br>Phe        | cgc<br>Arg        | ctt<br>Leu        | agc<br>Ser<br>220 | gcc<br>Ala        | cac<br>His        | tgc<br>Cys        | tcc<br>Ser        | tgt<br>Cys<br>225 | gac<br>Asp        | agc<br>Ser        | agg<br>Arg        | gat<br>Asp        | aac<br>Asn<br>230 | aca<br>Thr        | 1204 |
| ctg<br>Leu        | caa<br>Gln        | gtg<br>Val        | gac<br>Asp<br>235 | atc<br>Ile        | aac<br>Asn        | Gly<br>ggg        | ttc<br>Phe        | act<br>Thr<br>240 | acc<br>Thr        | ggc<br>Gly        | cgc<br>Arg        | cga<br>Arg        | ggt<br>Gly<br>245 | gac<br>Asp        | ctg<br>Leu        | 1252 |
| gcc<br>Ala        | acc<br>Thr        | att<br>Ile<br>250 | cat<br>His        | ggc<br>Gly        | atg<br>Met        | aac<br>Asn        | cgg<br>Arg<br>255 | cct<br>Pro        | ttc<br>Phe        | ctg<br>Leu        | ctt<br>Leu        | ctc<br>Leu<br>260 | atg<br>Met        | gcc<br>Ala        | acc<br>Thr        | 1300 |
| ccg<br>Pro        | ctg<br>Leu<br>265 | gag<br>Glu        | agg<br>Arg        | gcc<br>Ala        | cag<br>Gln        | cat<br>His<br>270 | ctg<br>Leu        | caa<br>Gln        | agc<br>Ser        | tcc<br>Ser        | cgg<br>Arg<br>275 | cac<br>His        | cgc<br>Arg        | cga<br>Arg        | gcc<br>Ala        | 1348 |
| ctg<br>Leu<br>280 | gac<br>Asp        | acc<br>Thr        | aac<br>Asn        | tat<br>Tyr        | tgc<br>Cys<br>285 | ttc<br>Phe        | agc<br>Ser        | tcc<br>Ser        | acg<br>Thr        | gag<br>Glu<br>290 | aag<br>Lys        | aac<br>Asn        | tgc<br>Cys        | tgc<br>Cys        | gtg<br>Val<br>295 | 1396 |
| cgg<br>Arg        | cag<br>Gln        | ctg<br>Leu        | tac<br>Tyr        | att<br>Ile<br>300 | gac<br>Asp        | ttc<br>Phe        | cgc<br>Arg        | aag<br>Lys        | gac<br>Asp<br>305 | ctc<br>Leu        | ggc<br>Gly        | tgg<br>Trp        | aag<br>Lys        | tgg<br>Trp<br>310 | atc<br>Ile        | 1444 |
| cac<br>His        | gag<br>Glu        | ccc<br>Pro        | aag<br>Lys<br>315 | ggc<br>Gly        | tac<br>Tyr        | cat<br>His        | gcc<br>Ala        | aac<br>Asn<br>320 | ttc<br>Phe        | tgc<br>Cys        | ctc<br>Leu        | gly<br>aaa        | ccc<br>Pro<br>325 | tgc<br>Cys        | ccc<br>Pro        | 1492 |

|           | c att<br>r Ile        |                          | Ser        |            |            |                   |            |            |            |            |                   |            |            |            |            | 1540 |
|-----------|-----------------------|--------------------------|------------|------------|------------|-------------------|------------|------------|------------|------------|-------------------|------------|------------|------------|------------|------|
| aa<br>As  | c cag<br>n Gln<br>345 | His                      | aac<br>Asn | ccg<br>Pro | ggc<br>Gly | gcc<br>Ala<br>350 | tcg<br>Ser | gcg<br>Ala | gcg<br>Ala | ccg<br>Pro | tgc<br>Cys<br>355 | tgc<br>Cys | gtg<br>Val | ccg<br>Pro | cag<br>Gln | 1588 |
|           | g ctg<br>a Leu<br>0   |                          |            |            |            |                   |            |            |            |            |                   |            |            |            |            | 1636 |
|           | g gag<br>l Glu        |                          |            |            |            |                   |            |            |            |            |                   |            |            |            | tga        | 1684 |
| gg        | tcccg                 | ccc                      | cgcc       | ccgc       | cc c       | gece              | egge       | a ggo      | cccg       | gccc       | cac               | cccg       | ccc (      | cgcc       | cccgct     | 1744 |
| gc        | cttgc                 | cca                      | tggg       | ggat       | gt at      | tttaa             | agga       | c ac       | cgtg       | cccc       | caa               | gccc       | acc        | tgggg      | gcccca     | 1804 |
| tt        | aaaga                 | tgg                      | agaga      | agg        |            |                   |            |            |            |            |                   |            |            |            |            | 1821 |
| <2<br><2  | 11><br>12>            | 5<br>390<br>PRT<br>Huma: | n          |            |            |                   |            |            |            |            |                   |            |            |            |            |      |
| <4        | 00>                   | 5                        |            |            |            |                   |            |            |            |            |                   |            |            |            |            |      |
| Me<br>1   | t Pro                 | Pro                      | Ser        | Gly<br>5   | Leu        | Arg               | Leu        | Leu        | Pro<br>10  | Leu        | Leu               | Leu        | Pro        | Leu<br>15  | Leu        |      |
| Tr        | o Leu                 | Leu                      | Val<br>20  | Leu        | Thr        | Pro               | Gly        | Prò<br>25  | Pro        | Ala        | Ala               | Gly        | Leu<br>30  | Ser        | Thr        |      |
| Су        | s Lys                 | Thr<br>35                | Ile        | Asp        | Met        | Glu               | Leu<br>40  |            |            |            | Lys               |            | Ile        | Glu        | Ala        |      |
| Il        | e Arg<br>50           | Gly                      | Gln        | Ile        | Leu        | Ser<br>55         | Lys        | Leu        | Arg        | Leu        | Ala<br>60         | Ser        | Pro        | Pro        | Ser        |      |
| Gl1<br>65 | ı Gly                 | Glu                      | Val        | Pro        | Pro<br>70  | Gly               | Pro        | Leu        | Pro        | Glu<br>75  | Ala               | Val        | Leu        | Ala        | Leu<br>80  |      |
| Ту        | Asn                   | Ser                      | Thr        | Arg<br>85  | Asp        | Arg               | Val        | Ala        | Gly<br>90  | Glu        | Ser               | Ala        | Glu        | Pro<br>95  | Glu        |      |
| Pro       | Glu                   | Pro                      | Glu<br>100 | Ala        | Asp        | Tyr               | Tyr        | Ala<br>105 | Lys        | Glu        | Val               | Thr        | Arg<br>110 | Val        | Leu        |      |

Met Val Glu Thr His Asn Glu Ile Tyr Asp Lys Phe Lys Gln Ser Thr 115 120 125

His Ser Ile Tyr Met Phe Phe Asn Thr Ser Glu Leu Arg Glu Ala Val 130 135 140

Pro Glu Pro Val Leu Leu Ser Arg Ala Glu Leu Arg Leu Leu Arg Leu 145 5 150 160

Lys Leu Lys Val Glu Gln His Val Glu Leu Tyr Gln Lys Tyr Ser Asn 165 170 175

Asn Ser Trp Arg Tyr Leu Ser Asn Arg Leu Leu Ala Pro Ser Asp Ser 180 185 190

Pro Glu Trp Leu Ser Phe Asp Val Thr Gly Val Val Arg Gln Trp Leu 195 200 205

Ser Arg Gly Glu Ile Glu Gly Phe Arg Leu Ser Ala His Cys Ser 210 215 220

Cys Asp Ser Arg Asp Asn Thr Leu Gln Val Asp Ile Asn Gly Phe Thr 225 230 235 235

Thr Gly Arg Arg Gly Asp Leu Ala Thr Ile His Gly Met Asn Arg Pro 245 250 255

Phe Leu Leu Met Ala Thr Pro Leu Glu Arg Ala Gln His Leu Gln 265 270

Ser Ser Arg His Arg Arg Ala Leu Asp Thr Asn Tyr Cys Phe Ser Ser 275 280 285

Thr Glu Lys Asn Cys Cys Val Arg Gln Leu Tyr Ile Asp Phe Arg Lys 290 295 300

Asp Leu Gly Trp Lys Trp Ile His Glu Pro Lys Gly Tyr His Ala Asn 305 310 315 320

Phe Cys Leu Gly Pro Cys Pro Tyr Ile Trp Ser Leu Asp Thr Gln Tyr 325 330 335

Ser Lys Val Leu Ala Leu Tyr Asn Gln His Asn Pro Gly Ala Ser Ala 340 345 350

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Ala Pro Cys Cys Val Pro Gln Ala Leu Glu Pro Leu Pro Ile Val Tyr
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Arg Ser Cys Lys Cys Ser
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660

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| aagccggggg | cccctca    |            |            |            |            | 1278 |